

# Retlif Testing Laboratories

795 Marconi Avenue, Ronkonkoma, NY 11779  
631-737-1500 - Fax: 631-737-1497

BRANCH LABORATORIES  
101 New Boston Road  
Goffstown, NH 03045  
603-497-4600 Fax 603-497-5281  
WASHINGTON  
REGULATORY OFFICE  
703-533-1614 Fax 703-533-1612



## FCC Compliance Test Report

On

2.4 GHz WIFI USB Transceiver  
Model Number: HFWFG10  
FCC ID: UILHFWFG10

**Customer Name:** hField Technologies, Inc.

**Customer P.O.:** 30

**Date of Report Rev.:** August 30, 2006

**Test Report No:** R-2911P, Rev A

**Test Start Date:** August 28, 2006

**Test Finish Date:** August 29, 2006

**Test Technician:** R. Soodoo

**Test Engineer:** R. J. Reitz

**Supervisor:** W. K. Hayes

**Report Rev. Prepared By:** D. Harter

Our letters, procedures and reports are for the exclusive use of the customer to whom they are addressed and their communication or the use of the name of Retlif Testing Laboratories must receive our prior written approval. Our letters, procedures and reports apply only to the sample tested and are not necessarily indicative of the qualities of apparently identical or similar products. The letters, procedures and reports and the name of Retlif Testing Laboratories or insignia are not to be used under any circumstances in advertising to the general public. This test report shall not be reproduced, except in full, without the written approval of Retlif Testing Laboratories. This test report shall not be reproduced, except in full, without the written approval of Retlif Testing Laboratories.

## Table of Contents

List of Tables.....	3
List of Figures .....	4
Certification and Signatures .....	5
Revision History .....	6
Test Program Summary .....	7
<b>1.0 Scope .....</b>	<b>8</b>
<b>2.0 Applicable Documents .....</b>	<b>8</b>
<b>3.0 Acronyms and Definitions .....</b>	<b>9</b>
<b>4.0 General Requirements.....</b>	<b>10</b>
4.1 Test Environment.....	10
4.1.1 Conducted Emissions .....	10
4.1.2 Radiated Emissions .....	10
4.1.2.1 Preliminary.....	10
4.1.2.2 Formal.....	10
4.2 Test Instrumentation .....	11
4.3 Detector Function.....	11
4.4 Frequency Range of Radiated Measurements .....	11
<b>5.0 Test Sample Description .....</b>	<b>12</b>
5.1 General.....	12
5.2 Input Power Requirements .....	12
5.3 Operating Mode .....	12
5.4 Configuration .....	12
5.5 System Cabling:.....	13
5.6 Leads Tested .....	13
5.7 Modifications .....	14
5.8 Support Equipment .....	14
<b>6.0 Test Methods Performed and Test Results .....</b>	<b>16</b>
6.1 Conducted Emissions, Paragraph 15.107(a), 150 kHz to 30 MHz.....	17
6.2 Radiated Emissions, Paragraph 15.109(a) 30 MHz to 25 GHz.....	29



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## List of Tables

Table 1 - Test Methods and Results .....	7
Table 2 - EUT Cable Configuration .....	13
Table 3 - Support Equipment .....	14
Table 4 - Test Sequence and Results .....	16
Table 5 - Conducted Emissions, Test Limits .....	17
Table 6 - Radiated Emissions, Test Parameters .....	29



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## List of Figures

Figure 1 - General Setup Photographs .....	15
Figure 2 - Conducted Emissions, General Test Setup .....	24
Figure 3 - Radiated Emissions, Test Setup.....	32

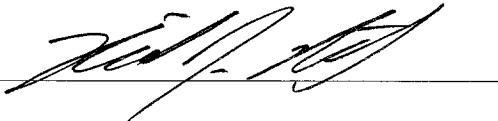


**Retlif Testing Laboratories**

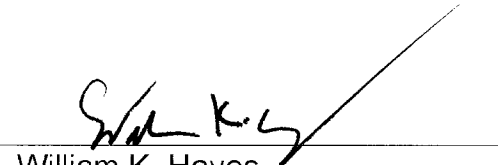
Test Report No. R-2911P, Rev. A

## Certification and Signatures

We certify that this report is a true report of the results obtained from the tests of the equipment stated, and relates only to the equipment tested. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.



Richard Reitz  
Laboratory Manager  
NVLAP Approved Signatory



William K. Hayes  
Executive Vice President

### Non-Warranty Provision

The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

### Non-Endorsement

This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This report must not be used by the client to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## Revision History

Revisions to this document are listed below; the latest revised document supersedes all previous issues of this document.

<b>Revision</b>	<b>Date</b>	<b>Pages Affected</b>
-	August 11, 2006	Original Release
A	August 30, 2006	Re-issue report to reflect full retest in ANSI C63.4 configuration.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## Test Program Summary

**Report Number:** R-2911P, Rev. A  
**Customer:** hField Technologies, Inc.  
**Address:** 11 East Packer Avenue  
Bethlehem, PA 18015  
**Test Sample:** 2.4 GHz WIFI USB Transceiver  
**Model Number:** HFWFG10  
**FCC ID:** UILHFWFG10

### Test Specification:

FCC Rules and Regulation Part 15, Subpart B, Class B.

### Mode of Operation:

During the performance of all testing specified herein, the EUT was configured as part of a peer to peer wireless network. It was configured to continuously transmit data on Channel 11 at a data rate of 11 MBPS.

(Note: During preliminary radiated emissions testing, the data rate and channel were varied in order to determine the operating mode which produced maximum emissions.)

### Test Methods:

The test methods performed on the 2.4 GHz WIFI USB Transceiver and the corresponding test results are shown in Table 1:

Table 1 - Test Methods and Results

Para. Herein	FCC Paragraph	Test Method	Test Results
6.1	15.107(a)	Conducted Emissions, 0.15 to 30 MHz	Complied
6.2	15.109(a)	Radiated Emissions, 30 MHz to 25 GHz	Complied



Retlif Testing Laboratories

Test Report No. R-2911P, Rev. A

## 1.0 Scope

This test report documents the methods used in measuring the conducted and radiated emissions produced by hField Technologies, Inc.'s 2.4 GHz WIFI USB Transceiver, Model Number: HFWFG10, FCC ID: UILHFWFG10. This report further serves to fully record the details of the sample tested including all interconnecting cables and support equipment. The objective of this test report is to demonstrate compliance of the 2.4 GHz WIFI USB Transceiver with the requirements for a Class B Personal Computer Peripheral as set forth in Part 15, Subpart B, of the Rules and Regulations of the Federal Communications Commission.

## 2.0 Applicable Documents

The following documents form a part of this test report to the extent specified herein:

RCM-001	- Retlif Testing Laboratories Calibration Manual.
RQM-001	- Retlif Testing Laboratories Quality Assurance Manual.
ISO/IEC 17025	- General Requirements for the Competence of Testing and Calibration Laboratories.
IEEE-Std-299	- Attenuation Measurements for Enclosures, Electromagnetic Shielding for Electronic Test Purposes.
ANSI/NCSL Z-540-1	- Calibration Laboratories and Measuring and Test Equipment – General Requirements.
FCC Part 15	- Federal Communications Commissions Part 15, Radio Frequency Devices, Subpart B, Unintentional Radiators.
CFR Title 47, Part 15	- Code of Federal Regulations, Title 47, Telecommunication, Part 15, Radio Frequency Devices.
ANSI C63.4:2003	- American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
CISPR 16: 2003	International Electrotechnical Commission Specification For Radio Disturbance And Immunity Measuring Apparatus And Methods – Part 1-1: Radio Disturbance And Immunity Measuring Apparatus – Measuring Apparatus, First edition 2003-11.
CISPR 22:1997	- Specification for Limits and Methods of Radio Interference Characteristics of Information Technology Equipment.
MIL-STD-220B	- Department of Defense, Test Method Standard, Method of Insertion Loss Measurement.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A



### 3.0 Acronyms and Definitions

The following acronyms may be used within this test report:

CE:	Conducted Emissions
dB:	Decibel
dB $\mu$ V:	Decibels Relative to One Microvolt
dB $\mu$ V/m:	Decibels Relative to One Microvolt per Meter
EMC:	Electromagnetic Compatibility
EUT:	Equipment Under Test
GHz:	Gigahertz
Hz:	Hertz
kHz:	Kilohertz
LISN:	Line Impedance Stabilization Network
MHz:	Megahertz
RE:	Radiated Emissions
RMS:	Root Mean Square
$\mu$ F:	Microfarad
$\mu$ H:	Microhenry
$\mu$ V:	microvolt
$\mu$ V/m:	Microvolts per Meter
$\Omega$ :	Ohm



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## 4.0 General Requirements

### 4.1 Test Environment

All testing was performed at Retlif Testing Laboratories facility. Each test method was performed in the environment specified within the test standard. Where the test environment deviated from that specified, it is noted in the applicable test method.

#### 4.1.1 Conducted Emissions

All conducted emissions testing described herein was performed with the EUT configured on an 80 cm high non-conductive table measuring 1.0 by 1.5 meters. The non-conductive table was situated on top of a conducting ground plane. The conducting ground plane for measuring AC power line conducted emissions consisted of the floor of a shielded enclosure. The conducting surface was of sufficient size such that it extended at least 0.5 m beyond the vertical projection (footprint) of the EUT, host and associated peripherals configured on the test table. In addition, the test bench was situated such that the rear of the test setup was located 40 cm from a vertical coupling plane (shielded enclosure wall).

#### 4.1.2 Radiated Emissions

##### 4.1.2.1 Preliminary

Preliminary radiated emissions measurements were performed in a shielded enclosure in order to determine worst case operating mode and to determine the emissions signature of the EUT.

##### 4.1.2.2 Formal

Formal radiated emissions testing was performed on an open area test site (OATS). The test site measured 12.0 m x 20.0 m and was covered with a conducting ground plane constructed of one quarter inch ground cloth. The equipment under test was placed in an RF transparent enclosure on top of a 1.2 diameter, flush mounted, metallic turntable. An 80 cm high non-metallic table was mounted to the turntable for placement of the EUT. The test site is in compliance with the normalized site attenuation requirements specified in ANSI C63.4 over the frequency range of 30 MHz to 1 GHz. The test site is listed with the FCC.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

#### 4.2 Test Instrumentation

A listing of all test instrumentation utilized is contained within each applicable test method. These listings indicate the model, manufacturer, frequency range, last calibration date and calibration due date of all instrumentation utilized. All instrumentation utilized was calibrated prior to use in accordance with the procedures set forth in Retlif Testing Laboratories standard manuals RCM-001 and RQM-001 which are in accordance with the requirements of ANSI/NCSS Z-540-1.

#### 4.3 Detector Function

For the conducted emissions testing described herein a Peak, Quasi-Peak and Average detector function was utilized as specified in CISPR 16.

For the radiated emissions testing below 1 GHz a Quasi-Peak detector function was utilized as specified in CISPR 16.

For the radiated emissions testing above 1 GHz an average detector function was utilized as specified in CISPR 16.

#### 4.4 Frequency Range of Radiated Measurements

Radiated Emissions measurements were performed over the frequency range of 30 MHz to 25 GHz.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## 5.0 Test Sample Description

### 5.1 General

The equipment under test was a 2.4 GHz WIFI USB Transceiver, hereafter referred to as EUT. The EUT was manufactured by hField Technologies, Inc. of Bethlehem, PA.

### 5.2 Input Power Requirements

The 2.4 GHz WIFI Transceiver derived its 5 VDC operating voltage from the host laptop PC.

### 5.3 Operating Mode

The EUT was configured as part of a peer to peer wireless network. It was configured to continuously transmit data on Channel 11 at a data rate of 11 MBPS.

(Note: During preliminary radiated emissions testing, the data rate and channel were varied in order to determine the operating mode which produced maximum emissions.)

### 5.4 Configuration

The EUT was configured in a minimum PC system as defined in ANSI C63.4. This system consisted of the following:

Description	Manufacturer	Model Number	Part Number	Serial Number
Laptop PC	Hewlett Packard	Pavilion zv5000	D5502A#ABA	CND4010Qft
Laptop PC Power Supply	Hewlett Packard	Series HSTNN-LA01	345512-001	N/A
Printer (Parallel Device)	Panasonic	KX-P1180	N/A	N/A
Mouse (Serial Device)	Dell	M-UK DEL3	831091-A000	HCJ53714771
Keyboard (Serial Device)	Dell	SK-8115	N/A	N/A
EUT (Serial Device)	hField Technologies	HFWFG10	N/A	N/A

The minimum system defined above was laid out on the 1 by 1.5 Meter test bench in accordance with ANSI C63.4. The laptop was placed such that the rear was flush with the rear of the test bench, and centered along its width. The parallel device (printer) was located 10 cm from the left edge of the laptop and flush with the rear edge of the test bench. The laptop power supply was located 10 cm from the right edge of the laptop and flush with the rear edge of the test bench. The external keyboard was located such that the front surface was flush with the front edge of the test bench and centered along its width. The external mouse was located 10 cm to the right of the keyboard and flush with the front edge of the test bench. The EUT was installed on the screen of the laptop PC such that it was centered along its width.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

NOTE: During preliminary radiated emissions testing the placement of the EUT was varied between the 10 cm offset location and the laptop screen mounting position. It was determined that the later produced maximum emissions and was in line with expected operation. Formal emissions measurements were therefore carried out with the EUT in this configuration.

5.5 System Cabling:

The following cables shown in Table 2 were used in the test system:

Table 2 - EUT Cable Configuration

Cable From	Length	S/U <sup>(1)</sup>	Cable Type	Cable Routed To
EUT USB Port	1.85 m	S	USB Cable	USB Port, Laptop
19.5 VDC AC Adapter	2.0 m	U	2-Conductor	DC Input, Laptop
120 VAC, 60 Hz Power Source Input	1.0 m	U	3-Conductor	AC Adapter, Input
120 VAC, 60 Hz Power Source Input Printer	1.8 m	U	3-Conductor	120 VAC, 60 Hz Printer Source
Parallel Port, Laptop	3.0 m	U	25 Dim Parallel Cable	Printer IEEE Port

<sup>(1)</sup>Shielded or Unshielded

All ports not listed were unterminated.

All system cabling was dressed in accordance with the requirements specified in ANSI C63.4. Where cable lengths were such that the cable was closer than 40 cm to the ground plane, they were bundled in 30 to 40 cm lengths until the separation between the ground reference plane and the cable was 40 cm.

5.6 Leads Tested

The following leads of the EUT were tested during the course of this testing program in order to ensure compliance:

- 115 VAC, 60 Hz Hot Input to Laptop Power Supply
- 115 VAC, 60 Hz Neutral Input to Laptop Power Supply



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

5.7 Modifications

No modifications were made to the EUT during the course of this testing program in order to demonstrate compliance with the specified requirements.

5.8 Support Equipment

The EUT utilized the support equipment in Table 3 in order to attain the above operating state during the course of this testing program:

Table 3 - Support Equipment

Description	Manufacturer	Part Number	Model Number	FCC ID Number
Dell Wireless USB Adapter	Dell	N/A	D14504	RGS9207U
AC Adapter	Dell	N/A	HPOQ065B83	N/A
Laptop	Dell	JH560A00	PP06S	E2K24BNHM



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

Figure 1 - General Setup Photographs



Conducted Emissions



Radiated Emissions

NOTE: During preliminary emissions testing the placement of the EUT was varied between the 10 cm offset location and the laptop screen mounting position. It was determined that the later produced maximum emissions and was in line with expected operation. Formal emissions measurements were therefore carried out with the EUT in this configuration.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## 6.0 Test Methods Performed and Test Results

The following test methods were performed on the 2.4 GHz WIFI USB Transceiver, Model Number: HFWFG10, FCC ID: UILHFWFG10, to the requirements of ANSI C63.4. All testing documented herein was performed in the sequence shown in Table 4:

Table 4 - Test Sequence and Results

Testing Date(s)	Para.	Standard	Test Method	Results
August 28 - August 29, 2006	6.2	FCC Part 15, Subpart B, Paragraph 15.109(a), Class B	Radiated Emissions	Complied
August 29, 2006	6.1	FCC Part 15, Subpart B, Paragraph 15.107(a), Class B	Conducted Emissions	Complied

See individual test methods contained in paragraphs 6.1 and 6.2 of this test report for a full description of the test procedures utilized and the results obtained.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A



## 6.1 Conducted Emissions, Paragraph 15.107(a), 150 kHz to 30 MHz

### Purpose

The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the EUT via conduction on the AC power leads in the frequency range of 0.15 to 30 MHz.

### Test Limits

The limits shown in Table 5 were used to determine the EUT compliance in accordance with FCC Rules and Regulations, Paragraph 15.107(a):

Table 5 - Conducted Emissions, Test Limits

Frequency Range	Class B Limits [dB (μV)]	
	Quasi-Peak	Average
0.15 MHz to 0.50 MHz	66.0 to 56.0	56.0 to 46.0
0.50 MHz to 5.00 MHz	56.0	46.0
5.00 MHz to 30.0 MHz	60.0	50.0

### Leads Tested

The following AC input power leads of the EUT were tested in order to demonstrate compliance:

- 115 VAC, 60 Hz Hot Input to Laptop Power Supply
- 115 VAC, 60 Hz Neutral Input to Laptop Power Supply

### Test Setup

The EUT was configured as shown in the attached photograph. This configuration was based on the test setup shown in Figure 1. The EUT was placed on a 0.8 m high wooden test stand above the floor of the test area (ground plane). The rear of the sample, including peripherals were aligned and flush with the rear of the test stand. The test stand was situated such that the EUT was located 0.4 m from one wall of the test area (the reference ground plane).

The EUT was located at least 0.8 m from all other grounded surfaces (walls, floor, and ceiling of the test area). The EUT's power cord was then connected to a 50 ohm/50 uH artificial mains network (LISN). The artificial mains network was mounted on the ground plane of the test area in a position that produced a minimum distance of 0.8 m between the EUT and the mains network. The EUT was connected to the artificial mains network by means of a cord of the type and length specified by the manufacturer. Where the cord length exceeded 1.0 m it was folded in 40 cm bundles until the overall length was equal to 1.0 m. The EUT was arranged with cables terminated in accordance with manufacturer instructions. Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the EUT.



Retlif Testing Laboratories

Test Report No. R-2911P, Rev. A

### **Test Setup (con't.)**

Excess interface cable length was draped over the back edge of the test stand. If any draped cable extended closer than 40 cm to the conducting ground plane, the excess was bundled in the center in a serpentine fashion using 40 cm lengths to maintain the 40 cm height.

### **Test Procedure**

With the test instrumentation and the EUT configured as stated above, the following steps were performed in accordance with Paragraph 11.5 of ANSI C63.4:

1. The test sample was arranged with cables terminated as specified in paragraph 4.2 herein.
2. The spectrum analyzer was configured to display the frequency range of 0.15 to 30 MHz.
3. The operating mode of the EUT was varied in order to determine the operating mode which produced the maximum conducted emissions with respect to the limit. This mode is detailed in paragraph 5.3 herein.
4. The spectrum analyzer was then configured to attain a max hold trace of the 115 VAC Hot lead in the 0.15 to 0.50 MHz frequency band utilizing a peak detector function.
5. The attained peak data was then compared to the average specified limit. If the obtained data was found to be in compliance with the average limit, then the test sample was found to comply.
6. If the obtained data did not comply with the average limit the scan was repeated utilizing a CISPR compliant receiver with a Quasi-Peak detector.
7. The attained Quasi-Peak data was then compared to the average specified limit. If the obtained data was found to be in compliance with the average limit, then the test sample was found to comply.
8. If the obtained data did not comply with the average limit step 6 was repeated utilizing an average detector.
9. The attained average data was then compared to the average specified limit. If the obtained data was found to be in compliance with the average limit, then the test sample was found to comply.
10. Steps 3 through 8 were repeated for each remaining lead of the EUT.
11. Steps 3 through 9 were repeated with the analyzer configured to acquire data in the 0.50 to 5.0 MHz range.
12. Steps 3 through 9 were repeated with the analyzer configured to acquire data in the 5.0 to 30 MHz range.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

**Test Results**

No emissions which exceeded the specified Part 15, Subpart B, Class B limits were observed and the EUT was found to comply with the requirements specified for this method.

See the following (2) two data sheets for a full presentation of the results obtained.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## Test Photographs Conducted Emissions



Test Setup



Rear Test Setup



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## Test Photographs Conducted Emissions



LISN Setup



Test Setup, Rear View



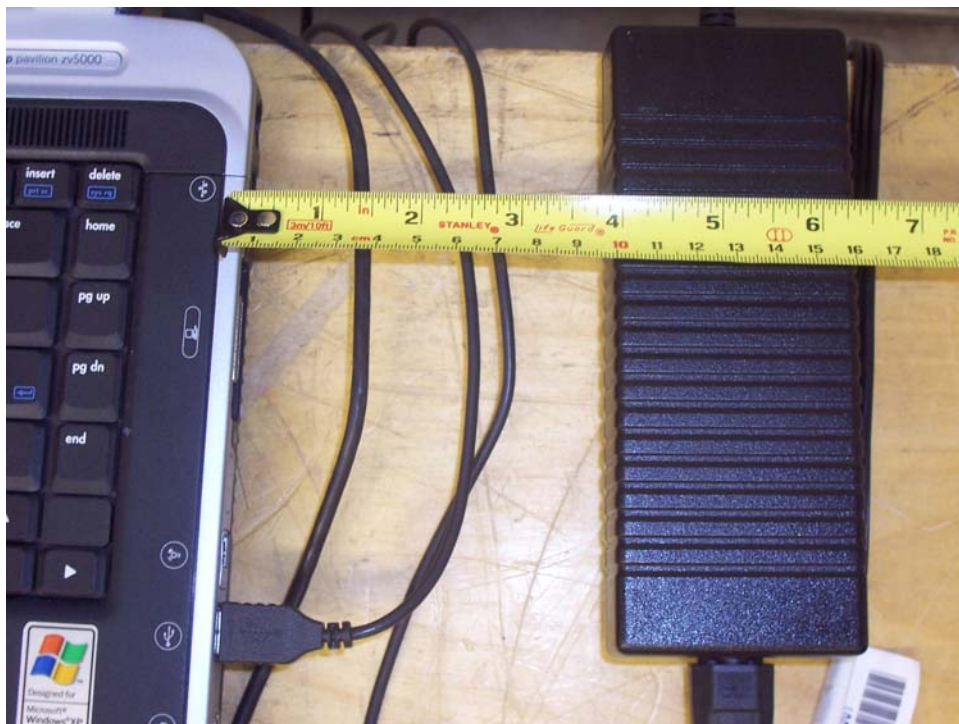
**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## Test Photographs Conducted Emissions



Mouse Setup



10 cm Spacing



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

**Test Photograph  
Conducted Emissions**



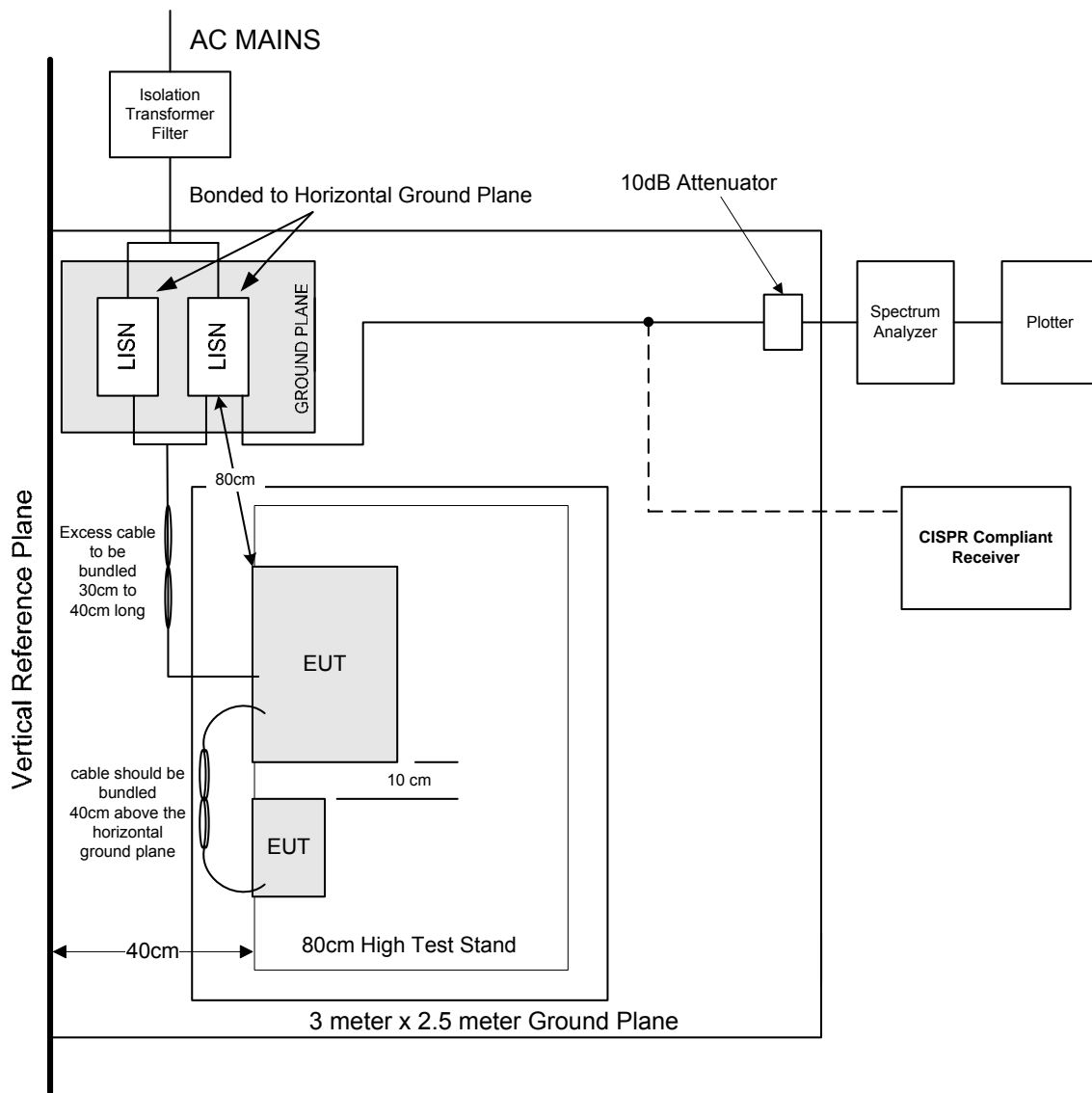
10 cm Spacing



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

Figure 2 - Conducted Emissions, General Test Setup



Retlif Testing Laboratories

Test Report No. R-2911P, Rev. A



## EQUIPMENT LIST

### FCC Part 15 Subpart B, Class B, Conducted Emissions, 150 kHz to 30 MHz

<b>EN</b>	<b>Type</b>	<b>Manufacturer</b>	<b>Description</b>	<b>Model No.</b>	<b>Cal Date</b>	<b>Due Date</b>
078	LISN	Solar Electronics	10 kHz - 30 MHz	8028-50-TS24BNC	6/29/2006	6/29/2007
079	LISN	Solar Electronics	10 kHz - 30 MHz	8028-50-TS24BNC	6/29/2006	6/29/2007
091	Shielded Enclosure	Retlif	10 kHz - 1 GHz	Room 6	10/15/2005	10/15/2006
333	Attenuator	Narda	DC - 11 GHz	768-10	8/10/2006	8/10/2007
456	LISN	Solar Electronics	DC - 60 Hz	9409-50-R-24	10/28/2005	10/28/2006
712	EMI Test Receiver	Rohde & Schwarz	20 Hz - 26.5 GHz	ESI26	10/15/2005	10/15/2006



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

FCC Part 15, Subpart B, Section 15.107(a), Conducted Emissions, Power Leads,  
150 kHz to 30 MHz  
Test Data

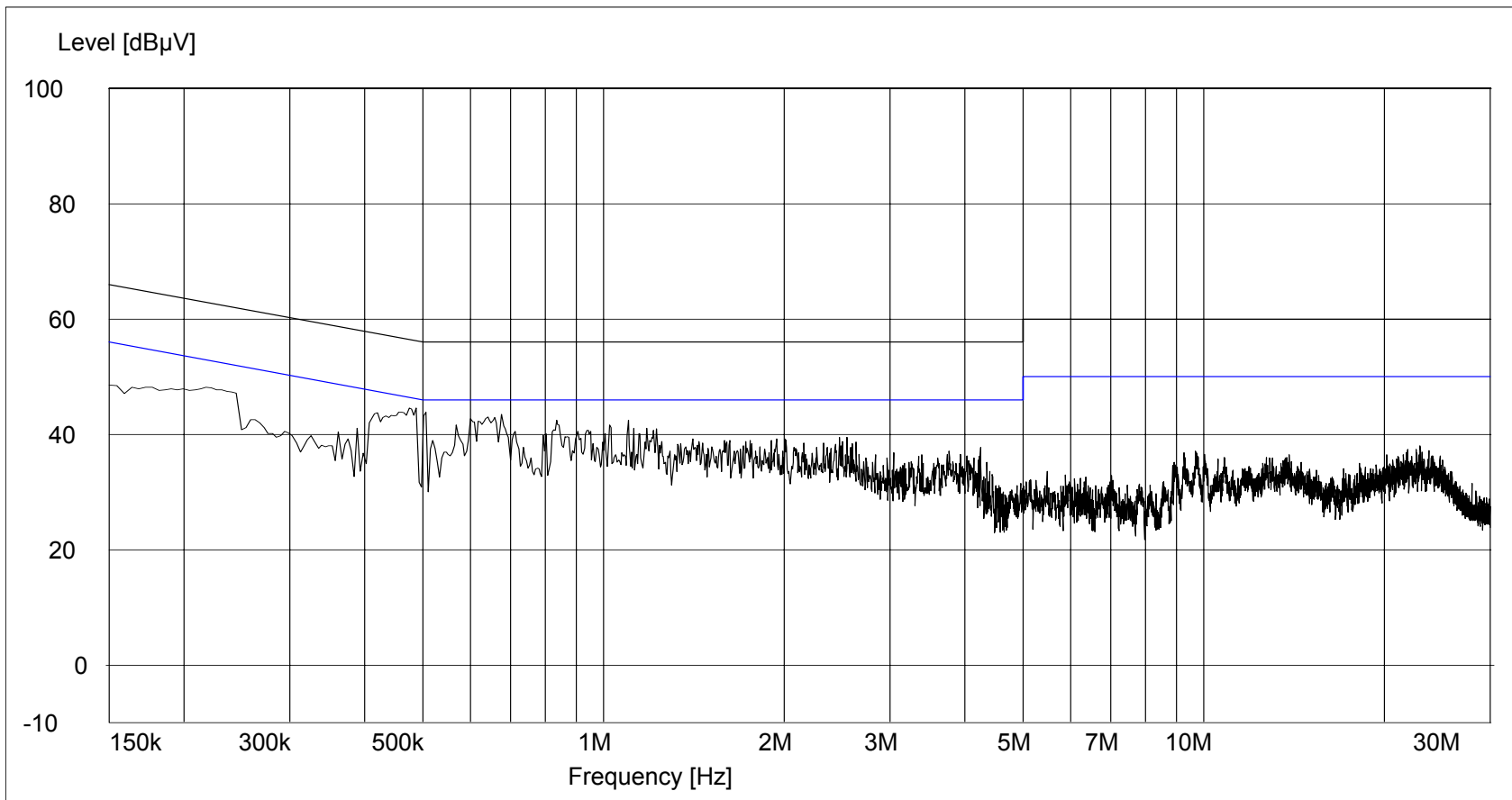


**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

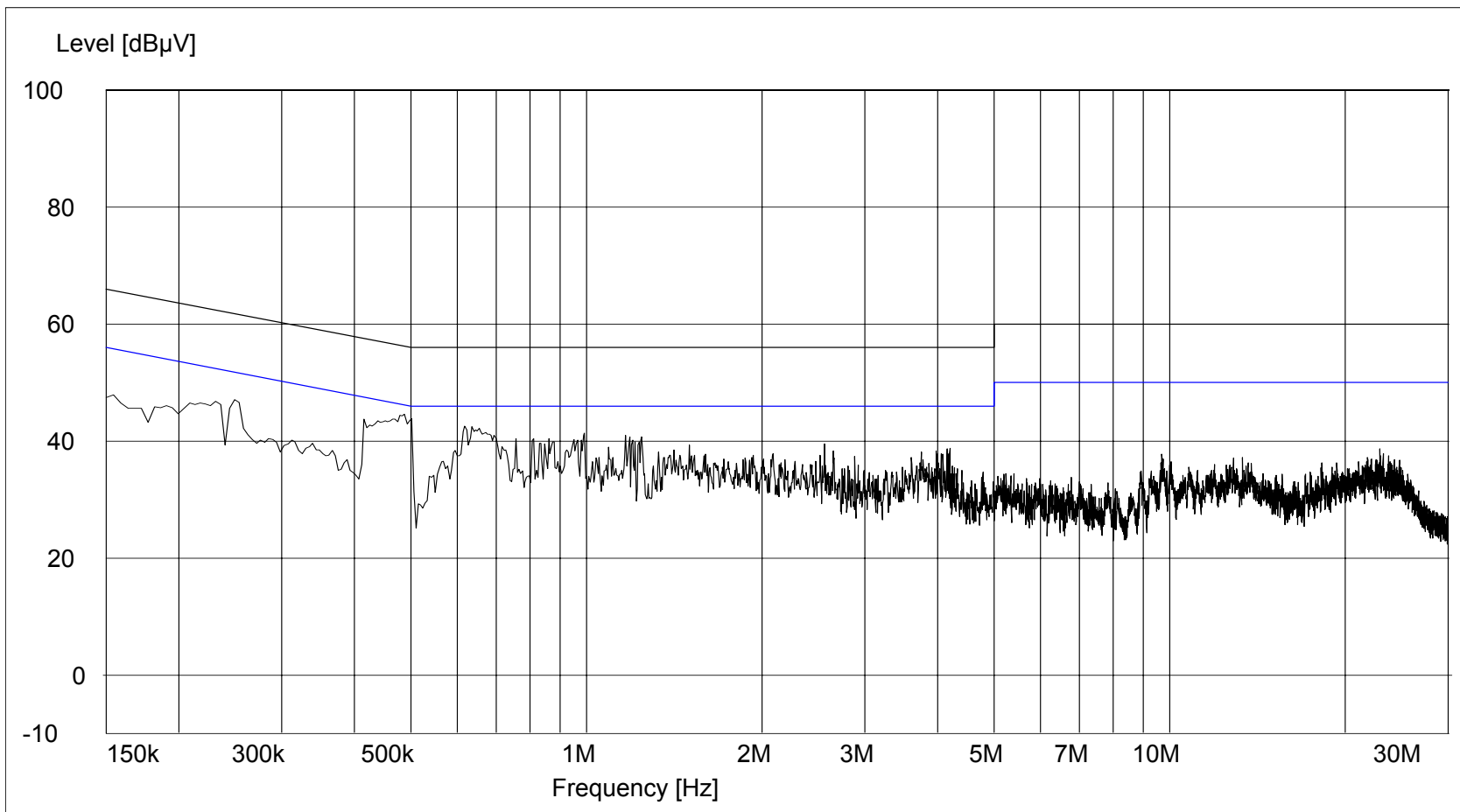
FCC Part 15, Subpart B, Class B, Conducted Emissions, 150 KHz to 30 MHz.

Customer: hField Technologies.  
Test Sample: 2.4 GHz WIFI USB Transceiver.  
Model Number: HFWFG10  
FCC ID Number: UILHFWFG10  
Test Specification: FCC Part 15, Subpart B, Section 15.107(a). Class B  
Mode of Operation: EUT continuously transmitting data on channel 11 at 11 Mbps.  
Lead Tested: 115 VAC, 60 Hz-Hot input to laptop power supply.  
Technician / Date: R. Soodoo / August 29, 2006.  
Detector / Note: Peak / Peak emissions passed average limit.



FCC Part 15, Subpart B, Class B, Conducted Emissions, 150 KHz to 30 MHz.

Customer: hField Technologies.  
Test Sample: 2.4 GHz WIFI USB Transceiver.  
Model Number: HFWFG10  
FCC ID Number: UILHFWFG10  
Test Specification: FCC Part 15, Subpart B, Section 15.107(a). Class B  
Mode of Operation: EUT continuously transmitting data on channel 11 at 11 Mbps.  
Lead Tested: 115 VAC, 60 Hz-Neutral input to laptop power supply.  
Technician / Date: R. Soodoo / August 29, 2006.  
Detector / Note: Peak / Peak emissions passed average limit.



## 6.2 Radiated Emissions, Paragraph 15.109(a) 30 MHz to 25 GHz

### Purpose

The purpose of this test was to determine the magnitude of the radio frequency emissions emanating from the EUT via radiation from its enclosure and connected cabling in the frequency range of 30 MHz to 25 GHz.

### Test Parameters

The limits shown in Table 6 were used to determine compliance of the EUT.

Table 6 - Radiated Emissions, Test Parameters

Frequency Range	Class B Limits at 3.0 Meters
	$\mu\text{V/m}$
30.0 MHz to 88.0 MHz	100.0
88.0 MHz to 216.0 MHz	150.0
216.0 MHz to 960.0 MHz	200.0
Above 960.0 MHz	500.0

### Test Setup

The EUT was configured as shown in the attached photograph. This configuration was based on the test setup shown in Figure 3. The EUT was placed on an 80 cm high wooden test stand above the ground plane of the shielded enclosure for preliminary measurements and the FCC listed OATS for final measurements. The rear of the EUT, including peripherals, were aligned and flush with the rear of the test stand. The test stand was placed directly on the flush mounted turn table. The turn table positions were relative to the EUT as follows: When facing the EUT the front is at 0°, the rear is at 180°, and the left side is at 270°. The test stand was situated such that the boundary of the EUT was located 3.0 m from the measuring antenna. The EUT was arranged on the test stand in accordance with the manufacturer's instructions.

Care was taken during testing to relocate all system components and cabling in an effort to maximize the emissions from the EUT. Excess interface cable length was draped over the back edge of the test stand. If any draped cable extended closer than 40 cm to the conducting ground plane, the excess was bundled in the center in a serpentine fashion using 40 cm lengths to maintain the 40 cm height. The AC power cable(s) were draped over the rear edge of the test stand and routed down to the AC mains.



Retlif Testing Laboratories

Test Report No. R-2911P, Rev. A

## Test Procedure

With the test instrumentation and the EUT configured as stated above, the following steps were performed in accordance with Paragraph 11.6 of ANSI C63.4:

1. The EUT was arranged with cables terminated as specified in paragraph 4.2 herein.
2. The spectrum analyzer was configured to display the frequency range of 30 MHz to 80 MHz.
3. With the test antenna horizontally polarized, the EUT cabling was relocated in order to maximize the radiated emissions.
4. The operating mode of the EUT was varied in order to determine the operating mode which produced maximum radiated emissions with respect to the limit.
5. Once the configuration, both cabling and operating mode, which produced maximum emissions was determined the EUT was maintained in this configuration for the duration of testing.
6. A max hold spectrum analyzer trace, trace A, was obtained with the EUT operating.
7. The EUT was powered off and a max hold spectrum analyzer trace, trace B, was obtained to denote the ambient interference levels.
8. The two obtained traces were analyzed in order to determine which recorded emissions were produced by the EUT.
9. At each frequency upon which an emission was determined to be from the EUT the following steps were performed in order to further maximize the observed emissions:
  - a. The test antenna height was varied from 1.0 to 4.0 m.
  - b. The test antenna polarization was varied from vertical to horizontal.
  - c. The EUT was rotated 360° about its vertical axis.
10. The test antenna RF cable was connected to the CISPR compliant receiver.
11. For all emissions found to be within 20 dB of the specified limit, the following was recorded on the x-y plot:
  - a. Frequency of emission
  - b. Quasi-Peak detector (or average as appropriate for frequency) receiver meter reading.
  - c. Correction factor consisting of antenna factor, cable loss and pre-amp gain.
  - d. Test antenna height and polarization.
  - e. Turntable position.
12. Steps 6 through 11 above were repeated for the following frequency ranges: 80 to 130 MHz, 130 to 200 MHz, 200 to 500 MHz, 500 to 750 MHz and 750 MHz to 1 GHz and 1 GHz to 25 GHz.

## Test Results

No emissions which exceeded the specified Part 15, Subpart B, Class B limits were observed and the EUT was found to comply with the requirements specified for this method.

See the following three (3) data sheets for a full presentation of the results obtained.



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

## Test Photographs Radiated Emissions



Test Setup, Front View



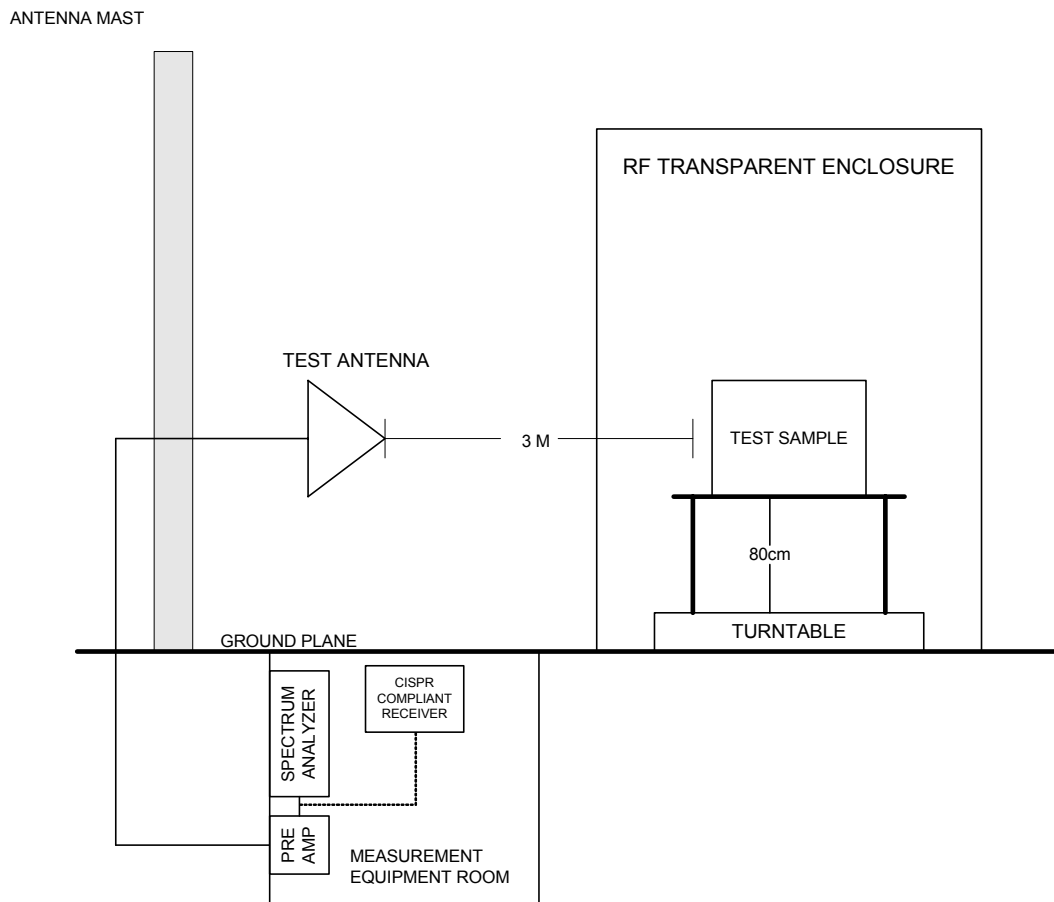
Test Setup, Rear View



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

Figure 3 - Radiated Emissions, Test Setup



Retlif Testing Laboratories

Test Report No. R-2911P, Rev. A



## EQUIPMENT LIST

### FCC Part 15 Subpart B, Class B, Radiated Emissions, 30 MHz to 25 GHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	10/1/2003	10/1/2006
129E	High Gain Horn Antenna	Microlab/FXR	18 GHz - 26.5 GHz	K638A	9/16/2005	9/16/2006
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	6/27/2006	6/27/2007
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	3/23/2006	9/23/2006
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	2/9/2006	2/9/2007
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	3/17/2006	9/17/2006
141C	Cable	Retlif	1 GHz ~ 26 GHz	1 METER, BLUE	1/4/2006	1/4/2007
141D	Cable	Retlif	1 GHz ~ 26 GHz	10 METER, BLACK	1/4/2006	1/4/2007
206B	6.0 dB Attenuator	Texscan	DC - 1.0 GHz	FP-50 - 6 dB	6/27/2006	6/27/2007
4003	Double Ridge Guide	Tensor	1 GHz - 18 GHz	4015	3/27/2006	3/27/2007
543	Preamplifier	Hewlett Packard	1.0 GHz - 26.5 GHz	8449B	9/9/2005	9/9/2007
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	2/21/2006	2/21/2007
712	EMI Test Receiver	Rohde & Schwarz	20 Hz - 26.5 GHz	ESI26	10/15/2005	10/15/2006
767	Biconilog	EMCO	26 - 2000 MHz	3142B	10/7/2005	10/7/2006



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

FCC Part 15, Subpart B, Class B, Radiated Emission, 30 MHz to 25 MHz  
Test Data



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A

<b>Test Method:</b>	FCC Part 15, Subpart B, Class B Radiated Emissions, 30 MHz to 25 GHz, Para. 15.109(a)						
<b>Customer:</b>	hField Technologies				<b>Job No.</b>	R-2911P	
<b>Test Sample:</b>	2.4 GHz WIFI USB Transceiver.						
<b>Model No.:</b>	HFWFG10				<b>FCC ID No.</b>	UILHFWFG10	
<b>Operating Mode:</b>	EUT continuously transmitting data on channel 11 at 11 Mbps.						
<b>Technician:</b>	R. Soodoo				<b>Date:</b>	August 28-29, 2006	
<b>Notes:</b>	Test Distance: 3 Meters			*Correction Factor = Preamp +Antenna + Cable Loss			
	Detector: Quasi-Peak Readings Below 1 GHz						
Test Freq.	Antenna Position	EUT Orientation	Meter Readings	*Correction Factor	Corrected Reading	Converted Reading	Limit
MHz	(V/H) / Meters	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
30.00							100
77.2	V / 1.0	135.0	24.0	9.2	33.2	45.7	
88.00							100
88.00							150
164.0	V / 1.0	158.0	21.0	11.9	32.9	44.2	
178.0	V / 1.0	315.0	12.0	12.0	24.0	15.8	
200.0	V / 1.5	180.0	17.0	12.3	29.3	29.2	
216.00							150
216.00							200
236.2	H / 1.0	45.0	25.0	14.0	39.0	89.1	
275.0	V / 1.0	45.0	13.0	15.3	28.3	26.0	
300.9	H / 1.0	135.0	23.0	15.9	38.9	88.1	
334.2	H / 1.0	135.0	23.0	17.7	40.7	108.4	
366.0	H / 1.0	315.0	20.0	18.7	38.7	86.1	
434.6	H / 1.0	270.0	9.0	20.0	29.0	28.2	
367.0	V / 1.5	180.0	16.0	18.7	34.7	54.3	
480.0	H / 1.0	225.0	20.0	21.6	41.6	120.2	
500.0	V / 1.0	158.0	2.0	21.5	23.5	15.0	
630.6	H / 1.0	315.0	14.0	24.2	38.2	81.3	
667.0	V / 1.5	315.0	12.0	25.0	37.0	70.8	
768.0	V / 1.0	315.0	7.0	26.1	33.1	45.2	
843.9	V / 1.0	180.0	6.0	27.0	33.0	44.7	
960.0							200
960.0							500
960.1	H / 1.0	9.0	18.0	28.1	46.1	201.8	
1000.0	V / 1.0	180.0	11.0	29.4	40.4	104.7	500
The EUT was scanned from 30 MHz to 25 GHz. The emissions observed from the EUT do not exceed the specified limits. Emissions not recorded were more than 20dB under the specified limit							



**Retlif Testing Laboratories**

Test Report No. R-2911P, Rev. A



